Stormwater Management Requirements

Guidance on the Chesapeake Bay Preservation Area Designation and Management Regulations

September 16 2002

Purpose:

The recent amendments to the Chesapeake Bay Preservation Area Designation and Management Regulations (Regulations) included changes to the specific provisions relating to on-site water quality treatment requirements and the resulting Structural and Non-structural Best Management Practice (BMP) requirements. The purpose of this guidance is to describe the stormwater management requirements in their revised form, and to specifically address issues that may arise as a result of those changes.

The changes, which incorporate by reference the water quality provisions of the Virginia Stormwater Management Regulations, are an attempt to unify and standardize the stormwater management performance criteria of the Chesapeake Bay Local Assistance Department (CBLAD) and the Department of Conservation and Recreation (DCR). With uniform performance criteria and uniform specifications and standards for the application of stormwater treatment technologies in Virginia, the application of these criteria should become more seamless, and less confusion and conflict will result regarding the proper application of these technologies.

Regulations:

- Section 9VAC10-20-120.8 now reads as follows, "Stormwater management criteria consistent with the water quality protection provisions (4 VAC 3-20-71 et seq.) of the Virginia Stormwater Management Regulations (4 VAC 3-20-10 et seq.) shall be satisfied."

Applicability:

The Chesapeake Bay Preservation Area Designation and Management Regulations state that the general performance criteria (9 VAC 10-20-120 et. Seq.), including the stormwater management requirements, apply to any use, development, or redevelopment of land in Chesapeake Bay Preservation Areas.

Discussion:

The revised regulations eliminate specific language relating to treatment requirements and incorporate by reference the water quality language contained in the Virginia Stormwater Management Regulations, *4 VAC 3-20-71 - Water quality*.

The Virginia Stormwater Management Regulations provide the option for localities to use either the Performance-Based approach (*4 VAC 3-20-71.B*), which is nearly identical in substance to the original language in the Regulations, or the Technology-based approach (*4 VAC 3-20-71.C*) for determining compliance with water quality criteria.

Water Quality Requirements

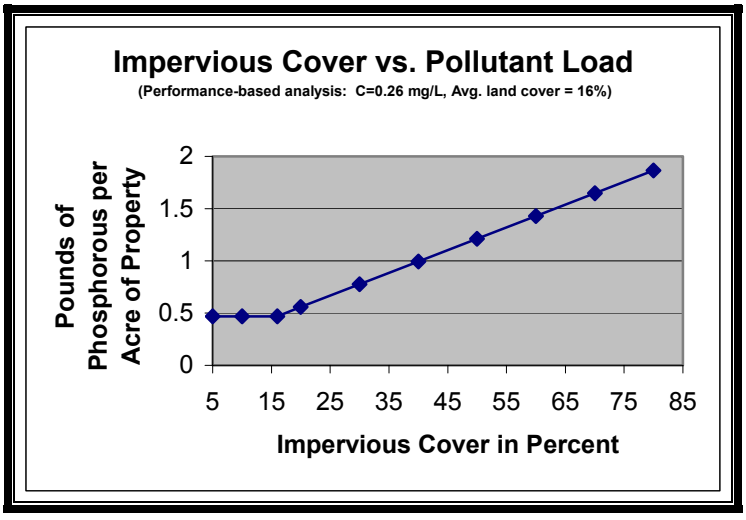
The incorporation by reference of the water quality provisions of the Virginia Stormwater Management Regulations (VSWMR) provides a single codified standard in Virginia for the appropriate technical criteria for stormwater quality BMPs and calculations. **These water quality requirements differ significantly from the original CBPA guidance calculation procedure in two ways:**

1. **Local Governments may now adopt and implement "Technology-based" criteria to satisfy the water quality requirements of the Chesapeake Bay Preservation Act.** While the "Performance-based approach" is still provided as an option in the VSWMR, the technology approach provides an alternative for determining water quality compliance. This may be appealing to many localities as a simplified method of determining compliance. In the technology approach, a designer selects a BMP in the appropriate technology tier based on the impervious cover of the site and suitability of the BMP technology for the given site, and applies this BMP, or a number of BMPs like it, to all of the runoff from a site. There are certain instances where this type of treatment approach is not feasible, and the performance-based approach must be relied upon. These instances are addressed in the next section.

2. **The water quality standards are now accompanied by a detailed set of specifications and design procedures, assembled in the Virginia Stormwater Management Handbook, along with revised efficiency tables based on more current research and data in the field of stormwater management.** The Virginia Stormwater Management Handbook has now become the standard for the design and construction of stormwater BMPs in Virginia. The handbook contains standards for landscaping, sediment forebays, outlet structure design, embankments, and many other integral components of a stormwater BMP plan. The handbook and pertinent addenda are available online from the DCR website.

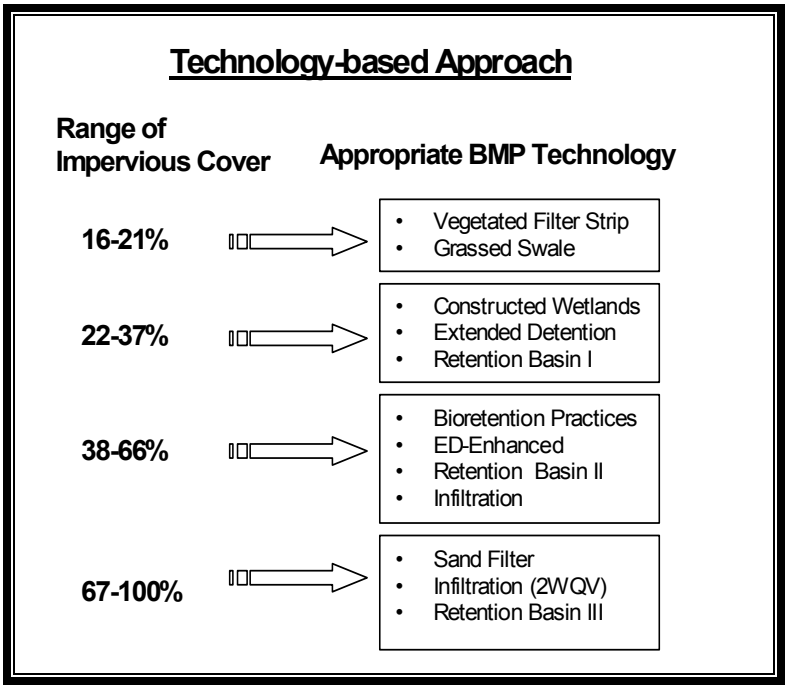
Performance vs. Technology Approach

The performance-based approach is a simplistic method for associating pollutant loads with the percentage of impervious cover, based on a given pollutant loading concentration. The method assumes the amount of runoff, and the corresponding pollutant loads, are directly proportional to the degree of impervious cover. BMPs with given pollutant removal efficiencies are applied to the site to reduce post-development loads to pre-development levels associated with an average land cover condition, or default (The reader is encouraged to refer to Chapter 5-10 of the Virginia SWM Handbook for additional discussion of the criteria.).



The technology-based approach is an option whereby the designer, based on the characteristics of the site (drainage area size, total impervious cover, engineering constraints, etc.), selects a BMP that is the most technologically appropriate solution to reduce post-development pollutant load. The detailed BMP standards and specifications referenced in the Virginia SWM Handbook are required elements necessary to achieve the referenced target pollutant removal efficiency. The intent is to shift the focus of BMP selection and design from debates over a few percentage points worth of pollutant removal efficiency to a new focus on the application of the most appropriate level of treatment technology for the site (See table below).

This approach assumes that the designer will apply sound engineering principles and specifications to the site design and will do everything practicable to reduce the pollutant loads through site design enhancements and configuration. The technology-based criteria is most applicable in situations where the percentage of impervious cover is high, such that multiple BMPs in series would be necessary to achieve the total pollutant load reduction required by the performance-based criteria. Inherent in the technology-based approach is the recognition that the application of BMPs in series will often yield little additional pollutant removal benefits (due to redundant removal pathways which target the same pollutants) versus a properly designed and maintained primary BMP with design enhancements, such as pretreatment of the runoff, and effective landscape plan, and a minimization of loads generated on the site.



There are some limitations to the application of the technology-based approach. This method may not provide the most appropriate basis for water quality assessment in situations such as the following:

- Multiple drainage areas on a site (which are not individually treated by the technology approach);
- When multiple BMPs are employed to obtain compliance with a Regional (watershed-wide) Stormwater Analyses;
- Sites which include: buffer equivalency calculations, redevelopment, subdivided parcels, etc.

In such instances, the performance-based approach should be employed.

The goal of providing two approaches for water quality assessment is to encourage localities to allow some latitude for a well thought out BMP plan, by allowing for reasonable adjustments to BMP efficiencies for a plan that provides an appropriate treatment technology and well-developed overall management plan. An unintended result is that some designers may examine the results of each method and then select the one that is least restrictive for the development being analyzed. While the two methods will generally provide similar overall results and likewise a similar degree of water quality protection, there may be cases where the results of such a comparison will favor one method over the other. In general, the performance-based method arrives at the result through an analytical, pollutant load and removal efficiency calculation process, and the technology-based method arrives at the result through a detailed set of specifications for Best Management Practices suited for the specific physical characteristics of the site.

Further information on the proper application of the Performance and Technology approaches can be found in *Technical Bulletin No. 4* of the Virginia Stormwater Management Handbook.

General Technical Criteria

The Regulations specifically incorporate by reference the Water Quality requirements (4 VAC 3-20-71), contained in the Virginia Stormwater Management Regulations. The General Technical Criteria (4 VAC 3-20-60) are not specifically referenced in the Chesapeake Bay Preservation Designation and Management Regulations, and therefore adoption of the General Technical Criteria is not *required* at the local level. However, the general technical criteria contained in the Virginia Stormwater Management Regulations represent a codification of sound engineering practices that may greatly aid in the implementation and administration of a stormwater management program. These general criteria relate to methods of determining pre and post-development runoff rates, determination of discharge points, and the construction of stormwater management practices. Localities are highly encouraged to incorporate the general technical criteria into their local ordinances or policies.

Program Review - Process and Coordination

The Chesapeake Bay Local Assistance Board (Board) is the appropriate review authority for local CBPA-related stormwater management requirements adopted pursuant to the Bay Act. Specifically, a review is required by the Chesapeake Bay Local Assistance Board for both major and minor modifications to local stormwater quality requirements and ordinances. The Board's staff, the Chesapeake Bay Local Assistance Department (CBLAD), works closely with DCR to reduce the duplication of any required reviews or reporting requirements for localities that choose to develop local programs pursuant to the VSWMR in addition to their CBPA program components.

CBLAD and DCR have agreed that **local programs using the default performance-based requirement provided for by the Bay Act may continue using the existing language in their ordinance to satisfy stormwater management requirements pursuant to the Chesapeake Bay Preservation Act, provided that the language is generally consistent (in substance) with the provisions for the Performance-based approach in the Virginia Stormwater Management Regulations, *4 VAC 3-20-71.C.*** As the VASWMR requirements are more permissive in what they allow (with the offering of the technology approach), localities may choose to continue offering only the performance-based approach, as they have in the past, to avoid any significant revisions to existing programs. However, the new efficiency table and new BMP design standards included in the Stormwater Regulations and Handbook should be used, as CBLAD will no longer be using its

previous guidance related to BMP efficiencies (Guidance Calculation Procedure, Appendix C of the *Chesapeake Bay Local Assistance Manual*).

Other local "alternative" or "equivalent" programs that were previously reviewed and approved by the Board in the past and determined to be equivalent will not need extensive ordinance revisions to satisfy the new stormwater language within the Regulations. The updated regulations still allow for differing local programs provided they have been reviewed by the Board and found to provide equivalent water quality protection. This means that local alternative or regional programs (e.g. James City County's technology-based program, the "Occoquan Method" widely used in Northern Virginia, and programs such as Henrico's stream restoration regional program, or Williamsburg's regional BMP and open space program) which have already been through this detailed water quality review at a programmatic level and were approved by the Board as an alternative approach do not need modification as a result of this regulatory revision. Please note that the development of regional pollutant trading programs, modifications to stormwater quality requirements language, and other major and minor modifications to CBPA water quality criteria and ordinances at the local level still require review and approval by the Board, as they always have. Localities should contact their CBLAD liaison to discuss the required process when considering modifications to their stormwater management ordinances.

BMP Efficiencies and Calculation Procedures

In conjunction with the issuance of this guidance, the Chesapeake Bay Local Assistance Department will now be referring to the documents in the table below as "historical guidance", and will refer to the Virginia Stormwater Management Handbook (along with any future guidance related to stormwater management published by the DCR or CBLAD) as the current and appropriate technical standard for Chesapeake Bay Preservation Act localities.

Historical Guidance Documents

Guidance Calculation Procedure (appendix C of the Local Assistance Manual)
Efficiency Tables and design references for structural BMPS (Table 2 in Appendix C of the Chesapeake Bay Local Assistance Manual)
Specific Stormwater Requirements referenced in the original Model Ordinance

The following table provides the estimated efficiencies for BMP designs referenced currently in the Virginia Stormwater Management Handbook. Localities are encouraged to use these efficiencies in the application of their local stormwater management requirements. Minor adjustments to the efficiencies provided here may be applied based on local experience with the technologies, qualified professional judgment, and monitoring of the technologies to ensure average removal efficiencies for urban pollutants that support differing performance claims. Virginia will be evaluating new BMP technologies as they are developed and refined and future updates to the Virginia Stormwater Management Handbook will include these new technologies. For more information and recommendations on BMP performance claim monitoring, assessment, and acceptance please refer to the document, *Stormwater Best Management Practice Demonstration - Tier II Protocol for Interstate Reciprocity* (Endorsed by California, Massachusetts, New Jersey, Pennsylvania, and Virginia), a copy of which is available by contacting the Chesapeake Bay Local Assistance Department, or on the world wide web at http://www.dep.state.pa.us/dep/deputate/pollprev/techservices/tarp/

BMPs and Phosphorous Removal Efficiencies

Water Quality BMP	Target Phosphorus Removal Efficiency
Vegetated Practices	
Vegetated Filter Strip – Min Std. 3.14	10%
Grass Swale (with check dams) - Min Std. 3.13	15%
Water Quality Swale - Min Std. 3.13	35%
Detention Practices and Wetlands	
Extended Detention (30-hr draw down of 2 x WQV) - Min Std. 3.07	35%
Enhanced Extended Detention (30-hr draw down of 1 x WQV, and 1 x WQV shallow marsh) - Min Std. 3.07	50%
Constructed Wetlands (2 x WQV) - Min Std. 3.09	30%
Retention Practices	
Retention Basin I (3 x WQV) - Min Std. 3.06	40%
Retention Basin II (4 x WQV) - Min Std. 3.06	50%
Retention Basin III (4 x WQV, aquatic bench) - Min Std. 3.06	65%
Infiltration Practices	
Infiltration Facility (storage volume = ½" runoff from impervious areas) - Min Std. 3.10	50%
Infiltration Facility (storage volume = 1" runoff from impervious areas) - Min Std. 3.10	65%
Bioretention/Biofiltration Practices – Min Std. 3.11, 3.11a, 3.11b	
Bioretention Basin (capture/treatment volume = ½" runoff from impervious areas)	50%
Bioretention Basin (capture/treatment volume = 1" runoff from impervious areas)	65%
Bioretention Filter (capture/treatment volume = ½" runoff from impervious areas)	50%
Bioretention Filter (capture/treatment volume = 1" runoff from impervious areas)	65%
Green Alleys (capture/treatment volume = ½" runoff from impervious areas)	50%
Green Alleys (capture/treatment volume = 1" runoff from impervious areas)	65%
Sand Filters	
Intermittent Sand Filter (treating ½" runoff from impervious areas) – Min Std. 3.12	65%
Manufactured BMPs – Min Std. 3.15	
Hydrodynamic Structures (*Stormceptor, Vortechs, Downstream Defender, BaySaver*)	15-20%
Filtering Structures (*StormFilter, StormTreat System*)	50%

NOTES:

WQV = Water quality volume (first ½" of runoff from the impervious surfaces)

The 30-hour draw down time of water quality volume pertains to the brim draw down time, beginning at the time of peak storage of the water quality volume. Brim draw down time means the time required for the entire calculated volume to drain out of the basin. See Virginia Stormwater Management Handbook Section 5-6.2 for methods to verify the draw down time and design performance.

Design Standards and Specification for the BMPs referenced in the table above can be found in the Virginia Stormwater Management Handbook.

Other highlights of the Handbook:

- It can be obtained, free of cost, by download from the DCR stormwater web site, http://www.dcr.state.va.us/sw/stormwat.htm.

- The new manual and technical bulletins eliminate reference to "new development" or "redevelopment" for the application of water quality criteria, and now provide reference to a number of "situations". Situations 1-4 referenced in the Virginia Stormwater Management Regulations provide a clear and concise way to determine the applicable water quality requirements for a given site. Situation #1 reflects the condition where no treatment is required, Situation #2 reflects the previous CBPA criteria for new development activities, Situation #3 reflects the previous CBPA criteria for redevelopment activities, and Situation #4 reflect the criteria for sites served by an existing water quality BMP.

- The new manual will be updated with new technical material related to stormwater quality technologies and approaches on a more frequent basis. CBLAD is working closely with DCR to ensure that guidance related to Stormwater Management in Virginia will be appropriately housed within technical addenda to this manual.

Conclusions:

Based on the discussion provided above, and to summarize, the Department provides the following guidance regarding the application of stormwater management performance criteria pursuant to the Chesapeake Bay Preservation Act:

- Local governments need not modify existing ordinance language relating to the performance-based approach to determining compliance if it is generally consistent with the performance approach described in the Virginia Stormwater Management Regulations, *4 VAC 3-20-71.B.*

- Localities currently applying the performance-based approach now have the option of offering the technology-based approach if they wish to revise their local ordinances and program structure to allow this. The design standards and specifications in the Virginia Stormwater Management Handbook apply.

- Localities operating under alternative or regional stormwater management programs, which were reviewed by the Chesapeake Bay Local Assistance Board and found to provide equivalent water quality protection, need not to revise their local programs to satisfy the revised stormwater management language in the Regulations.

- The Chesapeake Bay Local Assistance Board is still the appropriate review authority for determining consistency and compliance with the stormwater quality performance standards applied pursuant to the Chesapeake Bay Preservation Act. Modifications to stormwater programs in Tidewater localities still require review and oversight by the Board, and localities should contact their liaison when planning such modifications.

- The efficiencies and calculation methodology presented in Appendix C of the Chesapeake Bay Local Assistance Manual will now be referred to as historical guidance, and CBLAD will begin applying the guidance contained within Virginia Stormwater Management Handbook, technical bulletins provided as addenda to the manual, and subsequent guidance from CBLAD as the appropriate technical standard for CBPA localities.

- The Situations listed for the performance-based approach in the Virginia Stormwater Management Regulations and Handbook reflect the previous CBPA criteria for new development in Situation #2, and the redevelopment criteria in Situation #3.

On the web:

- **Chesapeake Bay Local Assistance Department – http://www.cblad.state.va.us**
- **Department of Conservation and Recreation – http://www.dcr.state.va.us**
- **Virginia Stormwater Management Handbook and Technical Bulletins –** http://www.dcr.state.va.us/sw/stormwat.htm#handbook
- **Virginia Stormwater Management Regulations -** http://www.dcr.state.va.us/sw/docs/VAswmregs.PDF
- **Virginia Stormwater Management Handbook, Technical Bulletin No. 4 –** ***Performance and Technology-based Approaches to Water Quality Assessment*** http://www.dcr.state.va.us/sw/docs/swm/tecbltn4.PDF
- **Stormwater Best Management Practice Demonstration - Tier II Protocol for Interstate Reciprocity -** http://www.dep.state.pa.us/dep/deputate/pollprev/techservices/tarp/ .